

Sharing Information about Wildlife



Improving
Wildlife Data
Quality

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Improving Wildlife Data Quality

Guidance on data verification, validation and their application in biological recording

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These guidance notes are designed to help people involved in biological recording or the use of wildlife data to improve the quality of the data they collect or compile.

1. Introduction

These guidance notes focus on wildlife data verification and validation, in the context of the overall collection, management and dissemination of wildlife information. They are intended for use by anyone involved in collecting or using wildlife data. They are not intended to be the last word. Different participants in biological recording will have more or less of a need to adopt particular methods. One solution will not suit everyone.

Because the business of collecting, managing and disseminating wildlife data is a web of processes, supported by a complex

Definitions:

Data verification: ensuring the accuracy of the identification of the things being recorded.

Data validation: carrying out standardised, often automated checks on the "completeness", accuracy of transmission and validity of the content of a record.

network of organisations and individuals, guidance on quality control mechanisms must also be based on a good understanding of the way the business works. This guidance also, therefore, deliberately touches on related matters, like survey methods and data dissemination, where these relate to the core concern of data quality, but does not attempt to give advice on these areas specifically. It aims to highlight key issues concerning data quality, and provides recommendations for particular organisations and individuals working as parts of the data network.

2. What are wildlife records and who makes them?

A basic wildlife record is a documented occurrence of an organism at a location, at a point in time by a named person. It is an attempt to document an ephemeral event linking a representative example of a species with a place and possibly with other individuals and other species. This is often summed up as:

What? ▶ Where? ▶ When? ▶ Who?

Underlying this, and of over-riding importance, is the other question:

Why?

This can be "why are we making this record?", as well as "why is this organism here?" or even "why do we think it is this species?". In order to understand data quality it is essential to appreciate the factors that can affect the accuracy and precision of

information relating to each part of a record. It is even more important to understand how the question "why?" can be of fundamental importance in both making an accurate and useful record, and in using these records effectively afterwards.

We therefore also need to understand the processes undergone in producing records, and in making use of them. A way of understanding this is by using a method of analysis called "data flow". This is dealt with in more detail in section 5, but, in essence, it can be summed up, in relation to a wildlife record, as:

Field observation

Data capture

Data collation

Data dissemination

Finally, we need to recognise and understand the functions of the different roles of those involved in making and disseminating records:

Field recorder

Identifier

Data compiler

Data custodian

Data disseminator



These guidance notes are therefore intended to address not only the general questions of data quality, but also who should be doing what in the process.

3. What makes a good wildlife record?

If we are making a wildlife record, there is not much point in doing so unless it is as correct and complete as possible. It becomes increasingly important for wildlife records to be “correct” the more these are used by others in understanding or making crucial decisions about biodiversity. The creation of a wildlife record is therefore a means of creating a “true” statement about the occurrence (or even the absence) of a species at a particular locality at a particular time. However, the number of variables involved is often considerable.

What is recorded will depend on the objective of the observer and of the organisation carrying out the survey. There will be questions about the likelihood of a particular species actually being found, either at all, or in a particular place. There will be issues of defining the locality and the “habitat”, both in relation to the way a survey is designed, and physically on the ground. There are often questions about which species is being recorded (or whether the individual specimen observed actually represents a “species” at all!). Above all, the way single observations fit into surveys is important; and in addition, the way observations are put together for analysis impinges on the reality of what has been recorded and the way the data

Check-box 1.

Key features underpinning the quality of biodiversity data:

- Accurate identification of the thing being recorded (species, habitat etc.)
- Precise recording of the geographical locality, depending on survey objectives.
- Careful documentation of other aspects of the record, such as time or date; the individuals that made the record; and the individuals that substantiated details of the record subsequently, where relevant.
- Clear links to and information on the location of any supporting documentation or voucher specimens.
- Transparency, robustness and appropriateness of the methods by which collected data are subsequently managed and made available to others.

are subsequently used.

Wildlife data include not only “traditional” species records, in whatever way they are made, but also increasingly include structured observations on habitats or other physical

features of the environment, either as the objects of recording themselves, or in relation to the presence of species. Standardised approaches to the way these are described also require accurate “identification” of what they represent.

The way we verify the main elements of a record in the first place, and secondly the way we validate associated factors or the processes through which details of the record have been managed, are therefore two of a range of issues which directly influence the way data users can judge the quality of the final data.

This guidance paper focuses especially on the two functions: data verification and validation. But they cannot be separated from the other equally important elements of data quality:

- Survey objectives and design.
- Organisational capacity to carry out the survey.
- Methods of data management and presentation.

Therefore, these notes draw attention to the need for organisations and individuals involved in recording to be aware of and understand how all these factors come together to create reliable records.

4. Who should be responsible for data quality?

The simple answer is: everyone involved in recording, data processing or data provision.

Basic principles of what makes for good quality data might be:

- Good quality data depend on collection of all relevant information as close to the point of observation as possible.
- Clear survey design and a statement of survey objectives are usually important, although casual recording may be useful, as long as the gathered data are structured in a useful way. In either case, having a clear policy from the outset on the level of accuracy required for a particular purpose, how this is to be achieved, and making this plain to participants is vital.
- Clarity from the outset over the role of individuals involved in the recording and data management processes is essential.
- Well thought-through processes of data management subsequent to field collection are vital.
- Clear documentation is needed of the way data are collected and processed so that others can judge what has been done

Potential sources of error and unreliability of data need to be recognised. These can come from people, processes and systems:

- Lack of relevant skills in field observers/collectors.
- Lack of appropriate reference to specialists or experts where these are needed.
- Lack of responsibility for or unmethodical processes of data collation, checking and presentation.
- Lack of technical skills in data management or lack of access to appropriate techniques or facilities.
- Mismatch between survey objectives and the application of recording methods, resulting in unevenness or inadequacy of survey coverage.

The way data quality is assured therefore depends to a great extent on the role of individuals and organisations in the process. There could be very formal ways to achieve data quality through officially recognised training, qualifications, and accreditation, alongside technical solutions to the management of data, which would require

imposed levels of acceptability of records. However, one of the outcomes of recent debates that have been undertaken through the NBN is the recognition that imposition of a one-size-fits-all solution would not only be impracticable, but also would be damaging to biological recording.

Most important has been the conclusion that a slightly more co-ordinated approach to the existing “peer review” process would be the most appropriate way forward, where the capabilities of recorders, and the accuracy of their records are judged by other people involved in the relevant recording community. This is because it can be a flexible approach, taking into account such things as an individual’s altered capability in a subject over time (but see Section 6.2 for a discussion of some of the difficulties such a system can face).

The capabilities and needs in different subject areas will also be different. Therefore it is considered better that responsibility for identifying recorder capabilities, or assessing the way that a particular recording activity is carried out should be left to those involved in a particular organisation or activity. However, general recommendations can be given which, if adopted, would allow them to demonstrate that they have addressed the need to assure the quality of the resulting data.

5. Data flow and data quality

Understanding the flow of data through the recording process is an essential first step in improving data quality. Advice on data flows and how an understanding of them can be applied to the improvement of data quality has been developed by the NBN Trust, revised in 2011 and is available from its website: www.nbn.org.uk



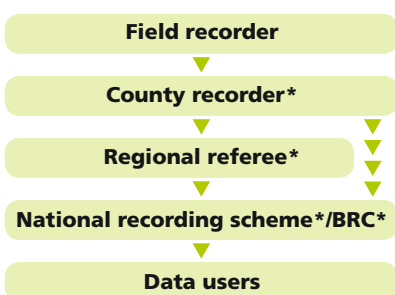
Understanding the flow of data is especially important for improving the quality of data overall by:

- Identifying how to reduce the amount of processing that records undergo, therefore reducing the likelihood of error.
- Defining responsibilities for and points where records should be checked at specific stages during the data management process.
- Establishing and promoting the most effective pathways for communicating data from and to other people or organisations.

It is not the aim of this guidance to promote any one data flow model for recording, which may not be appropriate or possible. However, it is important for people to recognise where their activities fit in the overall picture of recording. This in turn may help in simplifying these data flows through the development of mutual agreements between sectors and organisations involved.

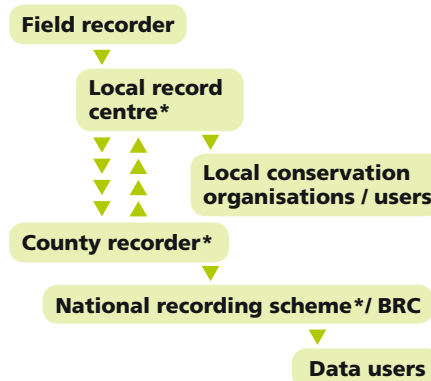
The following comparisons may help in appreciating the impact and limitations of particular data flow models, and might show how data flow modelling can be used to understand how processes work:

A traditional example of a data flow model for a voluntary sector recording scheme would be:



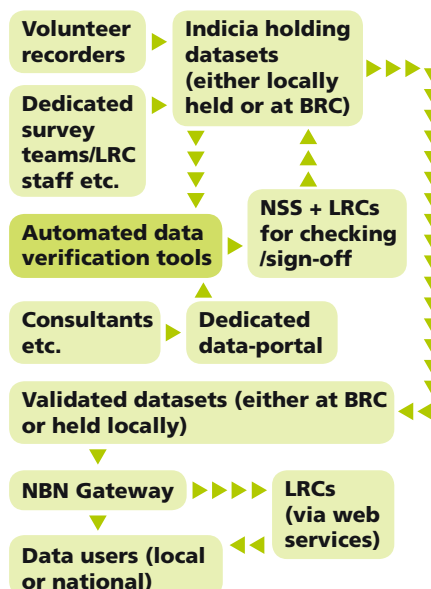
Points at which data validation might be carried out independent of the original supplier of records are marked: * This model is straightforward, but can place limitations on the extent of the use of data, through overload on the data dissemination process.

An alternative, if a local record centre is included in the process, might be:



This data flow, however, can and does lead to duplicated or different versions of data being made available to users from different sources, as well as requiring the voluntary County recorder to communicate with two different systems of data use, which is inefficient and can compound error.

The advent of the NBN Gateway added a new dimension to this, allowing data to flow from supplier to user electronically through the Web, as well as the integration of data from multiple sources. More recently, streamlined methods of data collection and data validation have become available, in particular online recording (e.g. NBN Trust's Indicia toolkit), and the use of automated tools to check data (NBN Record Cleaner). Data flows have continued to evolve to adjust to these developments, and might now look more like this:



The NBN Trust recognises that there will never be a single, agreed system for communicating all wildlife data and that data collected for specific uses may or may not need to be supplied to others. The NBN Gateway was established in order to provide a simplified mechanism for any participating body to communicate data to users, but it does not attempt to impose formal data flow mechanisms between field recorders, specific data collation bodies and data custodians.



Image © Peter Wakely, Natural England

Check-box 2.

The NBN Trust's 5 basic principles to assure wildlife data quality:

- Organisations involved in operating field recording programmes should promote standard methods of capturing and processes for submitting records wherever possible, while recognising that casual records received in other forms may still be valid, as long as they contain the basic minimum to be regarded as an effective record.
- Field records collected by individuals should be collated, preferably using standard formats, by either a recognised local or national species recording scheme, or by a formally established local record centre, if there is one in a particular area.
- Records collated by local voluntary organisations should undergo validation and verification where necessary either by their own recognised experts, or through submission to external experts or a national recording scheme, according to published protocols.
- Records collated by a local record centre should be subjected to verification and validation by recognised local or national experts where relevant, according to agreed, published protocols.
- Records collected by professional or other official organisations should be subject to as rigorous quality checks as those recommended for voluntary sector or local recording organisations, and they should consider making their data available for "peer review" by relevant experts where necessary before they are made available to others.

6. Roles and responsibilities for data quality

Actions can be broadly split into different areas, relating to stages in the process of collecting, collating and disseminating data. However, each area is dependent on another, so it is not possible in practice, for example, to entirely separate identification/verification from either survey operation or from the process of managing data.

6.1 Data collection

Bearing in mind that ensuring quality of data is best done as near to the point at which records are made as possible, the process of data collection becomes particularly important.

This might involve attention to:

- Survey design and method (appropriateness to the subject being studied, appropriate or realistic timescale, capacity to deliver required information).
- Availability of appropriate skills in those carrying out recording, or capacity to train if necessary.
- Availability of necessary data capture equipment or materials and the knowledge of how to use them.
- The potential for collected data to be used flexibly (e.g.: ensuring data are in formats accessible by others).
- Ensuring that all the necessary facts are recorded appropriately at the point of observation, backed up by collection of

appropriate evidence in support of a record where necessary.

This is not the place to issue detailed guidance on survey design or data capture methods. However, attention to details, such as providing guidance to field surveyors as to the way that recording is to be carried out, is an essential step in ensuring the quality of the resulting data. One example might be: pre-definition of the way that "aggregate species" are to be treated in plant recording, so that the resulting data represent equivalent levels of definition from different field workers.

See Case Study 1 for the use of survey design to enhance data quality; and Case Study 2 for the way a national society organises its data flow and data verification system.

Check-box 3.

Making field records - ways to enhance data quality

Standard record cards or data logger entry screens with clearly thought-out data entry formats, relevant to the survey objectives; appropriate for further data handling processes; and incorporating accurate species checklists (e.g. the British Dragonfly Society's recording card):

Odonata RA83	Locality						Grid Reference							
VC No	VC Name	DRN Site Recording Form	Day	Month	Year	Alt (m)	Conservation Status / Threats							
Code	Zygoptera (Damselflies)	Ad	Co	Ov	La	Ex	Em	Code	Anisoptera (Dragonflies)					
0103	<i>Calopteryx splendens</i>	Banded Demoiselle						2201	<i>Aeshna caerulea</i>	Azure Hawker				
0102	<i>Calopteryx virgo</i>	Beautiful Demoiselle						2209	<i>Aeshna cyanea</i>	Southern Hawker				
0405	<i>Lestes dryas</i>	Scarce Emerald Damselfly						2207	<i>Aeshna grandis</i>	Brown Hawker				
0404	<i>Lestes sponsa</i>	Emerald Damselfly						2212	<i>Aeshna isosceles</i>	Norfolk Hawker				
0407	<i>Lestes viridis</i>	Willow Emerald Damselfly						2204	<i>Aeshna juncea</i>	Common Hawker				
1010	<i>Coenagrion hastulatum</i>	Northern Damselfly						2210	<i>Aeshna mixta</i>	Migrant Hawker				
1009	<i>Coenagrion lunulatum</i>	Irish Damselfly						2401	<i>Anax imperator</i>	Emperor Dragonfly				
1002	<i>Coenagrion mercuriale</i>	Southern Damselfly						2403	<i>Anax parthenope</i>	Lesser Emperor				
1007	<i>Coenagrion puella</i>	Azure Damselfly						2101	<i>Brachytron pratense</i>	Hairy Dragonfly				
1006	<i>Coenagrion pulchellum</i>	Variable Damselfly						1502	<i>Gomphus vulgatissimus</i>	Common Club-tail				
1101	<i>Erythromma najas</i>	Red-eyed Damselfly						2601	<i>Cordulegaster boltonii</i>	Golden-ringed Dragonfly				
1102	<i>Erythromma viridulum</i>	Small Red-eyed Damselfly						2701	<i>Cordulia aenea</i>	Downy Emerald				
0601	<i>Pyrthosoma nymphula</i>	Large Red Damselfly						2804	<i>Somatochlora arctica</i>	Northern Emerald				
0901	<i>Enallagma cyathigerum</i>	Common Blue Damselfly						2802	<i>Somatochlora metallica</i>	Brilliant Emerald				
0801	<i>Ischnura elegans</i>	Blue-tailed Damselfly						3903	<i>Leucorhinia dubia</i>	White-faced Darter				
0805	<i>Ischnura pumilio</i>	Scarce Blue-tailed Damselfly						3201	<i>Libellula depressa</i>	Broad-bodied Chaser				
1301	<i>Ceragrion tenellum</i>	Small Red Damselfly						3202	<i>Libellula fulva</i>	Scarce Chaser				
0504	<i>Platycnemis pennipes</i>	White-legged Damselfly						3204	<i>Libellula quadrimaculata</i>	Four-spotted Chaser				
Recorder(s)		No.						3309	<i>Orthetrum cancellatum</i>	Black-tailed Skimmer				
Card Compiler		No.						3302	<i>Orthetrum coerulescens</i>	Keeled Skimmer				
Source of Record		No.						3812	<i>Sympetrum danae</i>	Black Darter				
Estimated Nos.	Key to Columns	Habitat / Comments												
A 1	Ad Adult (Total number)	Transect <input type="checkbox"/> Map on back of form <input type="checkbox"/>												
B 2-5	Co Copulating pair													
C 6-20	Ov Ovipositing													
D 21-100	La Larva													
E 101-500	Ex Exuvia													
F 500+	Em Emergent													
+ Present														
<p>IMPORTANT: By submitting information on this form you agree that it may be collated and disseminated manually or electronically, including the Internet, for environmental decision-making, education, research and other public benefit uses in accordance with the Dragonfly Recording Network's data access policy. Names and contact details of data suppliers will be used in accordance with the Dragonfly Recording Network's privacy policy. Both these policies can be found at http://www.british-dragonflies.org.uk/.</p>														

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These should ensure that all relevant data are captured at the point of observation wherever possible. They should be backed up by clear instructions on their use.

Training for field surveyors in the aims and methods of the survey.

Training for field surveyors in field identification and use of literature (e.g. how to use scientific names correctly, interpretation of a recording entity comprising an aggregation of species, how to recognise hybrids etc.).

Guidance in how to use GPS or map reading to ensure accurate map refs. (e.g. know about the

potential inaccuracies of GPS).

Clear procedures for and reasons why, when and how to collect voucher specimens, and how to handle them, where to send them, in what way (e.g. dried plants in absorbent paper, not in plastic bags).

6.2 Identification and verification

Being sure of the identity of the thing recorded is obviously crucial. Responsibilities for and ways of ensuring accurate identification are not just the province of the field recorder, and fall into discrete areas:

Field identification

For species recording, the capacity of field observers to identify what they are recording is obviously a controlling factor, as outlined above. But how can an organisation be sure of species identifications, and to what level is it possible or necessary to go?



Efforts to set up standard qualifications to define individuals' capabilities have been attempted in the past. Although training is highly important, use of such qualifications often falls down on a number of counts: inability to impose a rigid framework on volunteers or staff across a wide range of organisations; change of a person's ability and experience over time; different levels of capacity of an individual with different taxonomic groups; or differences in a person's capability in different geographical areas or even in different habitat types.

"Peer review" has tended to be the way individuals' capacity to record, and therefore the reliability or otherwise of their records, has been judged (as highlighted in Section 4). It is open to abuse, though, such as through favouritism or personal bias, or merely through an organisation's lack of knowledge about the capacity of its recorders.

The questions of who judges the capabilities of field recorders and how are crucially important in the operation of any recording scheme or survey, and need particular attention from the outset. Some recording organisations use a somewhat formalised "checklist" approach:

- **Beginner:** little experience, and with low levels of use of identification facilities or knowledge of methods; only common or easily identifiable species records acceptable without other evidence.

- **Experienced:** with good levels of field experience, possibly limited by geographical region or habitat types, but with access to adequate literature and facilities; records of most readily-identifiable species acceptable.
- **Expert:** with wide and deep understanding of their particular groups, good access to relevant literature and facilities, usually networking with others in their field; most records accepted, except some taxa needing critical determination.
- **Authority:** a nationally or internationally recognised expert in the determination and taxonomy of a particular group, operating alongside extensive reference material and other authorities; definitive judgement on identifications, except where taxonomic disagreements might occur.

In practice, application of such a system can be difficult, for the reasons already given. However, an experienced survey organiser may find that such a checklist can be used as a guide to the way they form a judgement. In addition, they will need to consider the capability of an individual to learn and develop their knowledge, or whether a hitherto accepted level of expertise may be declining, through age of the individual for example, or new advances in the subject. There have been calls to make this process "transparent", with formal accreditation of recorders. However, others have pointed out the very human issues involved in formalising this kind of system, not least in the face of possible legal action for "defamation", and that focusing on the record rather than the recorder is best, with the willingness of the recorder to collect and submit a voucher specimen or other evidence being the test of whether or not their data are likely to be reliable. "Mentors" can also be used to help newly recruited recorders improve; while established recorders might be encouraged to undergo "refresher" training.

Whatever way a scheme or survey approaches this difficult issue, there can be an advantage in spreading the load of making judgements. A regionalised, or partnership approach is one way of doing so. In doing this, it is advisable to put in place a more formal structure, with clearly defined roles and lines of communication, and to produce a protocol or "code of conduct" for how the system is intended to work, so that all those involved can see where they fit and how judgements are made.

Verifying records

To be clear: verification of a record is to do with the accuracy of the identification of the thing being recorded - either a species or other factors, such as habitats.

To augment a survey or recording scheme's assessment of recorder capabilities, there needs to be an agreed process of verifying incoming records, where necessary, so that any judgement about a particular record can be carried out without overtly calling into question

the capabilities of the recorder. If a clearly publicised system is put in place, it can then be used to adjudicate objectively over records where needed.

For recording species, either as part of a recording scheme or alongside other survey work, this could involve a number of different activities:

- Recording schemes or organisations setting up a survey have a responsibility to take the lead with setting standards for identification. They should define agreed levels of "difficulty" over the identification of the species being recorded. Checklists defining level of difficulty for each taxon should be produced, alongside a degree of competence (defined in terms of the skill level of the identifier) at which an identification would be acceptable. Geographical variation in these designations may need to be recognised.
- The scheme or organisation should define whether or not a voucher specimen or other evidence needs to be collected and determined by an expert or panel of referees at an appropriate level for particular species. This should include advice on how a voucher or other evidence should be collected and how they should be submitted for determination, bearing in mind Codes of Conduct for collecting. It should also specify ways that such vouchers or documents are to be maintained for the future and who does this.
- Agreed panels of experts for particular taxonomic groups should be established where possible: in relation to particular species groups, geographical areas; or for use during the process of a particular survey; and the level at which these experts will operate should be defined (e.g. at a county, regional or national level).
- Agreed protocols on the use and support of these functions need to be produced, including clear levels of responsibility for carrying them out at different points in the survey or data gathering process (see the discussion of Data Flow in Section 5).
- Clear mechanisms should be established during data management for documenting decisions made over the verification of particular records, including details of by whom, when and why decisions were made.

Proposals were made at a local record centre seminar in Edinburgh in November 2005 that record categories in JNCC's 'Recorder' database should be standardised:

- Correct
- Considered likely to be correct
- Possibly correct [= unconfirmed]
- Considered likely to be incorrect
- Incorrect
- Not yet checked

Check-box 4.

Identification - ways to ensure data quality

Focus on the accuracy of the record, not the recorder.

Use "checklists" of competence carefully, and as a guide, not a "last word".

Set out and publicise clear guidance on what are "critical" species/taxa for identification, and what are not.

Set out clear requirements as to when and how voucher specimens or other evidence need to be collected and submitted to named experts.

Have clear procedures in place and make sure databases have the capacity for documenting decisions on identifications: who did them, when, and how.

Produce guidance on the way species (or other things) should be identified, and set up training for field recorders.

Consider the use of "mentors" to help newly-recruited recorders.

Set up panels of referees or experts for referring "difficult" cases.

Publicise the way that a survey or recording scheme aims to handle the question of identification.

Ensure that clear procedures are implemented for the collection and maintenance of necessary evidence in support of records: descriptions, photographs or specimens.

For recording habitat or physiographical features, the questions are rather different, because the entity being recorded is not definable in quite the same way as an individual organism. Checking recorded details against likely or expected features can be a basis of data verification in these cases. These might include:

- Checklists of species used for defining habitat types, including proportions of populations.
- Checklists of attributes of habitats (e.g.: structure, water levels, humidity, pH).
- Mechanisms for comparing known occurrence of habitat features against new records.

Having a well-publicised and transparent process of record verification in place from the outset safeguards a recording scheme or survey from doubts about its quality control and methods, as well as distancing the process of verification to some extent from problems of human relationships. Other aspects of records also need attention during the process of recording, and can to some extent be verified in a similar way. These include recording of geographical locality, date, sample sizes, etc.

See Case Study 3 for a local record centre's approach to data verification; and Case Study 5 for a computer data collation system being used to validate data.

6.3 Quality control during data management

The roles of the data compiler and of the person carrying out subsequent data management are also crucial for ensuring data quality. While the basic facts of a record can be controlled to a great extent before or at the point of the record being made, "data capture" (entering a record into a data logger, computer system or database), and data manipulation subsequently are both potential sources of error, and can be improved by better ways of working, or by the use of automated tools. This is not the place for detailed guidance on data management. However, a few issues need to be highlighted relating to data quality:

- ensuring that data management processes do not over-ride or impair the integrity of captured data (e.g. through automated database processes);
- designing data management processes that deliver data in ways that are appropriate for the subject and of direct use to the data users;
- ensuring proper documentation of data management processes that have been carried out, and that this information remains with the data.

At different stages during the data management process different quality control issues need to be considered:

- Data collation (mechanisms used to do this need to maintain details of provenance, intellectual property etc., as well as maintaining the specific integrity of identifications, locality data etc. contained within original records). Archiving of original source material and associated documents is also needed.
- Data manipulation (the capacity for such activities to remove valuable parts of records through imposition of "standard" formats etc., or for automated operations to "scramble" data need to be guarded against).
- Data analysis (the application of analytical tools needs to be appropriate for the kind of data being used to avoid spurious conclusions or summaries being produced).

Use of tailored data management systems will help in this, especially those designed with wildlife data quality in mind from the outset, although none of the existing systems are perfect. Specially designed data capture software, such as 'Aditsite', 'MapMate' and 'Recorder' are de facto standards for data capture and data management in different ways. Both 'Recorder' and 'MapMate', for example, have some in-built data validation; while their internal mapping can also be used to pick up records with erroneous grid references.

Use of other proprietary databases or even spreadsheets may be satisfactory, but greater attention to details, such as ensuring proper management and checking of dates, taxonomic names etc., will be needed when setting them up.

Particular problems can occur with the use of taxonomic checklists in proprietary databases. Slight differences in the use or presentation of names may result in problems of data collation and reporting. The NBN Species Dictionary aims to alleviate these difficulties by providing a unified system of recommended checklists and synonymy. Making this dictionary available to all who need to use it is an ongoing process in the NBN.

Other problems with proprietary databases may include inadequate ability to handle information concerning data sources, poor associated electronic document handling and in particular inadequate application of metadata associated with datasets.

Most recently online recording has begun to streamline data capture processes, cutting down errors, and also enabling data validation and verification to be partly automated from field record through to database.

Check-box 5.

Compiling data - quality control checks and procedures

Aim to acquire raw data in standard formats (e.g. standard recording forms, the use of data loggers (that enable error-free transmission of data to a database), or through online recording).

Ensure necessary verification procedures have been carried out, preferably before collation of data into databases.

Use standardised data entry systems (e.g. purpose-built databases or adapted spreadsheets, with in-built taxon checklists, habitat codes, or use dedicated online systems).

Use recognised standard term lists, taxon checklists, habitat codes etc. wherever possible (e.g. NBN Species Dictionary).

Ensure all relevant parts of records are retained during data capture, including details of determinations, locations of vouchers, sources of records etc. Arrange for original records to be archived as a back-up.

Aim for standardised data formats (e.g. dates, place-names, uniform formats of locality details, personal names).

Carry out data validation routines on data entry (grid refs, dates, sources), and make use of automated validation tools (e.g. NBN Record Cleaner) on compiled datasets.

Remember it is easier to correct a record at the start than it is to expunge a faulty record once it has been disseminated.

Data validation

Validation is the term applied to the process of carrying out standardised checks on the “completeness”, and “validity” of the content of a record. Working practices and mechanisms to ensure that species or other facts are properly recorded in the first place can be supplemented by automated validation during data management, e.g.:

- Appropriate use of taxonomic names and authorities.
- Identifications validated against checklists.
- Statuses of taxa correct.
- Format of grid references correct.
- Grid references checked against counties/vice-counties or other defined geographic areas.
- Site names checked against standard gazetteers.
- Formats and contents of dates correct.
- Dates checked against survey periods.
- Observer/compiler/determiner names checked against standard lists.
- Validity of record sources checked.

The NBN has focused a lot of effort in these areas through the promotion of an NBN Data Standard, and through developing methods and tools for handling data collation etc., in particular the NBN Data Exchange Format and the NBN Record Cleaner for carrying out basic routines on collated datasets. These are available from the NBN website. Alternatively, techniques for carrying out validation may be available from existing institutions, such as the UK Biological Records Centre or local record centres, or can be developed in-house.

In addition, a tool that the NBN Gateway has implemented is its Data Validation mechanism - a remote system to aid data validation, whereby a dataset is made available through the NBN Gateway to logged-on users, and these are able to submit comments on specific records.

Features of the NBN Record Cleaner can be seen in Case Study 6. Validation processes used by the UK BRC are shown in Case Study 4.

6.4 Data quality and the data custodian

The role of a data custodian in maintaining and promoting data quality is especially important at the dataset level. Their role is to ensure that proper processes are carried out in maintaining data, and in such a way that the data can be communicated readily to others. Providing data to third parties therefore also includes the need to address data quality issues. A key aim here is that the communication of information or data should be as transparent to the user as possible, enabling them to be as sure as they can be that the data they are using are fit for the purpose for which they intend to use them. The NBN Trust, through the setting up of the NBN Gateway, has attempted to address many of these issues, but other bodies handling datasets and passing data to users, either

in pre-digested form or as raw data, should ensure that quality control measures are being addressed.

Actions could include:

- Maintain adequate documentation about the accuracy of identifications, within definable limits, including:
 - re-determinations or levels of taxonomic application where these are important to the way the data are to be used;
 - use of standard definitions of habitats/biomes;
 - ensuring standard documentation of other attributes, such as dates, sampling methods etc.
- Make sure that the appropriate level of detail to which the data may be interpreted is clear to users (such as the level of resolution of the original survey, or the extent of coverage of a survey, temporally or geographically).
- Ensure the retention and communication of quality information from data providers or third parties.
- Document clearly information on the provenance of data, so that users can make their own judgements about its authenticity, as well as allowing them to make appropriate acknowledgments.

Some aspects of this need attention to the requirements of things like the Data Protection Act, or Copyright legislation, which may limit what can be done with important information relating to the quality of data. Detailed guidance on these has already been issued by the NBN Trust, available through its website.

A data custodian may or may not be the original compiler of the data. If they are not, then data custodians need to ensure that their practices of data management are agreed with the data provider and that any data quality processes carried out are appropriate to their needs.

6.5 Data dissemination and data quality

The business of disseminating data itself is beyond the remit of this guidance. However, the process of dissemination needs to reflect and uphold the quality issues that have been addressed during the data capture and data management processes. There are many ways to communicate data between a custodian and a user, and some of these will be specific to particular situations, while others are more general. In any case attention to some basic principles is important in maintaining overall data quality and confidence in the use of the data.

The most important tool for describing and communicating information about data quality is “metadata”. Metadata is a mechanism for documenting the source and characteristics of datasets of any sort, but especially electronic data. It aims to produce a standardised description of the data, with details of what the dataset consists of; why it was made and by whom; who owns it; and its

reliability. This metadata description should be retained alongside datasets and attached to data sent to third parties to ensure that future users can understand the origin of the data, and therefore understand restrictions on and purposes for which they can be used.

The NBN Trust was set up to enable better data communication, and its NBN Gateway is a prime mechanism developed to do this. For dissemination of data through the NBN Gateway, the Trust has focused on the concept of making data of “known quality” available, and has promoted the use of standard metadata to address at least the basics of this. NBN metadata follows minimum requirements to conform to the “UK Gemini 2” standard. This enables holders of data that relate to geographical areas to standardise the way data are described.

The standard NBN metadata format records information on:

- Name of the dataset.
- Name of the dataset provider.
- Subject of the data.
- Methods of data capture.
- Purpose of survey or data capture.
- Geographical extent of survey.
- Time span of survey.
- Outline of ways in which data were checked.
- External sources of information about the data.
- Access and use constraints.

One prime aim of the metadata is to enable a dataset that is provided through the NBN Gateway to be judged for its reliability. However, standard metadata of this type can be used in other situations, and is recommended as good practice generally.

Implementation of metadata in proprietary databases has been mentioned in Section 6.3. Some database systems do not handle this very thoroughly, if at all, and further development is needed in this area.

Guidance on compiling NBN standard metadata has been issued by the NBN Trust separately, and is available through the website.



7. Who should be doing what to support data quality?

In Section 4, it was suggested that everyone involved in the recording and wildlife data process should have at least some responsibility for ensuring data quality.

However, it is possible to identify some kinds of organisations that are best placed to carry out some of the specific roles and tasks that have been identified above.

National Societies and Recording Schemes

These organisations (and individuals) have a key role to play in underpinning species data quality in the UK. They are usually the focal point of taxonomic understanding of their subject, and are in a pivotal position to be able to influence the quality of records and recording. However, their resources are often not enough to sustain some of the work this might entail, and this is an area that needs further support and strengthening in many of them if they are to take on these roles more formally.

Recommended actions

Bearing this caveat in mind, Societies and Schemes should be in a position to:

- Develop and clarify survey objectives and needs for a particular taxonomic group, and identify recommended sampling and field survey methods.
[Such guidelines should be promoted not only through the society or recording scheme concerned, but more widely, so that other potentially interested bodies can tailor their methods and activities to suit accordingly.]
- Draw up standard lists of species for groups, which define those that are “critical”, requiring expert determination at respective levels; those that are acceptable from “competent” recorders; and those (if any) that are acceptable from other sources.
[These checklists should be made available both to volunteers and others in the recording schemes themselves, as well as to third parties to improve processes of recording elsewhere.]
- Formulate and keep up to date potential panels of referees or experts to whom records requiring validation might be referred.
[This may be an impossible task for many groups, owing to a lack of people with the relevant expertise, and the potential for an overload, so that such referees may only be available to members or upon payment of a fee. However, in some groups it may be possible for local or regional panels of referees to be established, in collaboration with local groups or local record centres, to share the load.]

- Produce guidance on the collection, processing and housing of voucher material for a group.
[This should include advice on preparation and curatorial techniques, as well as on the potential housing of accumulated collections for reference. There is much scope for collaborative work on this between societies and with external institutions, such as museums and local record centres (see below).]
- Produce protocols for the documentation of records to assure data quality
[Such protocols should not only relate to the way the Society or Recording Scheme carries out its own data management, but also give advice to others handling data in these groups.]
- Publish general guidance on recording in their taxonomic groups, including field recording methods, roles and responsibilities for identifications, training etc.
- Aim to rationalise the processes by which data from other bodies, such as local record centres, might be verified.
[For example, data from a local record centre could be validated remotely by Society referees or vice-county recorders, using the NBN Gateway, or through online recording systems using the NBN Gateway. In exchange, a local record centre could come into an agreement to handle automated data processing and validation checks for relevant Societies and Schemes at the local/regional level.]

Several national societies are either in the process of drawing up such guidance, or have done so already to some extent. Co-ordinated promotion of such guidance is needed for the benefit of a wider community.

Local record centres (and related organisations, e.g. local natural history departments of museums)

Local record centres, where they are fully-functional, may already have a strong role in promoting data quality among their own volunteer recording community. However, this is often carried out independently of other organisations, and integration of their efforts with those of the national societies and recording schemes would be particularly beneficial. However, while data quality may be important internally for the operation of a particular centre, the centre may not be supported adequately to underpin a wider remit, and this may be an area which requires strengthening and further support, particularly through encouraging its primary sponsors to recognise these roles as central to its operation.

Recommended actions

Local record centres especially could:

- Re-examine their data quality and data management methods to see if improvements can be made.
[Many records centres will already be carrying out many of the processes highlighted in this guidance. However, moving towards the standards that allow easy data exchange through the NBN Gateway may need improvements in some areas].
- Establish local panels of referees, in partnership with local specialists.
[Many centres already have these. They can oversee records from their areas, according to agreed criteria, but in some cases may need to be integrated with the relevant national societies or recording schemes so that levels of capabilities and acceptability of records can be agreed, and processes can be standardised].
- Enter into data capture, data management and quality assurance agreements for data from other organisations or individuals.
[These roles could be especially useful in ensuring that data from other local sources are brought in to agreed processes of data verification and validation].
- Enter into agreements with relevant national recording schemes to assist with validation of datasets
[One area of expertise that a local record centre can usually bring is the ability to quality control locality data. They may also be able to validate other aspects of records for voluntary schemes, such as standardised use of terms, or recorder/ determiner names]
- Carry out data capture and other automated data validation processes on behalf of local individuals or groups.
[This could include handling feedback from NBN Gateway validation routines on behalf of local groups].
- Instigate training in recording at the local level.
[Again, for this to work most effectively, collaborative work with the relevant local or regional representatives of the national societies would be beneficial].
- Enter into partnerships with relevant organisations to maintain local or regional facilities for receiving and managing necessary voucher material in support of records.
[This requires partnership development with, in particular, local or regional museums and the development of agreed criteria for identifying the need to maintain vouchers].
- Provide proper documentation and metadata to users alongside their own and third party data supplied to others, e.g. through the NBN Gateway.

Non-governmental biodiversity organisations

There is a wide range of non-governmental biodiversity or conservation organisations that collect data, both at national and local levels, such as wildlife trusts, the National Trust, Woodland Trust, RSPB and so on. Many, especially larger ones, already have sophisticated survey and data management practices in place, but some of the smaller ones may not. Even if they have, they may not have addressed some of the data verification and validation issues outlined in these guidance notes.

NGOs also may or may not communicate effectively with existing networks of information, at the national or local levels. It would be especially beneficial for their recording to be more fully integrated with those of both the national societies and recording schemes on the one hand, and with local record centres on the other. Putting in place mechanisms to make use of these networks to verify and validate their data might be one way of doing this.

NGOs might also need to integrate their approach with other activities underpinning data quality, such as identification training, issuing guidance on survey methods, collection of voucher specimens, etc.



Recommended actions

- Adopt NBN Record Cleaner for internal data management. Where this tool has yet to implement criteria for specific taxonomic groups, work with relevant Societies and Schemes to develop and make use of them.
- Establish data management and data validation agreements with relevant national societies and recording schemes and local record centres.
- Work with appropriate national societies and local record centres to develop identification training for their staff and volunteers.
- Work with relevant societies and schemes to develop agreed methods for and guidance on surveys and recording for use within their organisations.
- Develop and publish protocols for the dissemination of their own data, e.g. through the NBN.

Statutory and other official biodiversity organisations (including academic departments, research institutions etc.)

These organisations have a range of roles in relation to the maintenance of data quality, including data verification and validation. These include:

- Providing support for existing networks of organisations carrying out survey, data verification and validation roles.
- Collecting and managing their own data.
- Making use of data for strategic, research and management purposes.
- Making their data available for third parties.

Recommended actions

It is not possible to produce detailed recommendations here for the verification and validation of data collected or held by this wide range of bodies. However, it is worth reiterating the points made in Section 5:

- Data collected by professional or other official organisations should be subject to as rigorous quality checks as those recommended for voluntary sector or local recording organisations, especially if the data are to be disseminated to others.
- These organisations should consider making their data available for “peer review” by relevant experts where necessary before they are made available to others.

It would be desirable if these organisations could integrate their data verification as much as possible with the existing specialist networks that underpin data quality, especially with the relevant national societies and recording schemes. However, it would be unreasonable to expect voluntary bodies to undertake substantial data verification processes for official organisations without material support. In this respect the advent of NBN Record Cleaner, which incorporates automated processes of data validation and which was developed with the help of Schemes will assist in making use of their capabilities. Potential actions might therefore also include:

- Adopt NBN Record Cleaner for internal data management. Where this tool has yet to implement criteria for specific taxonomic groups, work with relevant Societies and Schemes to develop and make use of them.
- Examine further ways to support the role of the key specialist organisations in carrying out this work.

The NBN Gateway’s Data Validation function is another way that an organisation’s data may be validated using expertise from a Society or Scheme, but to succeed would require a

specific agreement with the Society as to how this could be done.

Another role of some official organisations is often overlooked, and that is the vital role that museums, some university departments, botanic gardens and their key staff play in verifying data through identification of specimens and provision of access to reference collections and libraries. The recently accelerating tendency for these facilities and expertise not to be retained or replaced needs to be reversed if data quality overall is not to suffer. An action for statutory and other official organisations involved with biodiversity data in support of this role might be:

- Promote partnership arrangements between biological recording organisations and relevant institutions for the maintenance and use of biological reference collections and research facilities.

Finally, Conservation Agencies in particular, and especially the Joint Nature Conservation Committee, have a special responsibility for assisting the biological recording communities to improve the standard of their data, particularly bearing in mind their capacity to influence the systems of data management currently available. A specific action in this area has been the development of NBN Record Cleaner.

Commercial and professional biodiversity organisations

Commercial ecological consultancies and other professional bodies have roles in collecting, managing and using biodiversity data that need to be recognised. Questions of data quality will exist with all their data, just as they do in other bodies. Enabling them to tap into the data verification and validation network available to the voluntary and official sectors may present difficulties, but the benefits would be considerable, enabling their data to contribute to the pool.

Recommended actions

Some potential actions might include:

- Set up formal agreements over access to data with and sponsorship of voluntary organisations responsible for data verification.
- Establish partnerships with local record centres or other biodiversity organisations to enable commercially acquired data to be managed, validated and made more widely available, e.g. through the NBN Gateway.
- Professional institutions supporting the commercial biodiversity sector (notably the Institute for Ecology and Environmental Management) could issue codes of conduct and professional guidance in support of data quality for use by commercial bodies.

8. Case Studies

Case Studies 1

(An example of survey design and metadata upholding data quality)

The Survey of Bryophytes of Arable Land (SBAL)

SBAL was set up in 2001 by the British Bryological Society to get baseline data on the distribution and ecology of bryophytes in tilled land in the UK.

The field survey

Clear project aims and a sampling strategy were defined:

- To survey single fields with crops or fallow soils.
- To survey in autumn, winter or early spring.
- Two fields each to be selected from 100 random tetrads in areas with at least 15% arable land use.
- If suitable fields in random squares were not found, nearby suitable fields were

substituted. In addition "ordinary" fields were visited by field workers not able to visit random ones, as well as "special" fields with rare species.

Occurrence of species was augmented with DOMIN abundance data.

Field surveyors were issued with a pack containing guidance notes, identification aids and standard record cards. Training in field survey was set up, with specially run field days.

Progress reports on the survey were put on the BBS website and in the Society's newsletter, and in later stages of the survey participants were additionally encouraged individually to complete the survey.

Data collation

Field record cards were submitted to the Biological Records Centre for processing as the survey progressed.

Initial cards returned were checked by the scheme organisers for compliance with field methodology, as well as for identification.

Data were captured in yearly batches by experienced data processing staff, using standard data inputting software for entry into an Oracle database.

Compiled data were subsequently checked using an Access database, with locality data checked visually once, and species lists for each locality separately, using the BRC species numbers used for data inputting as an auto-generator for species names.

Data analysis and reporting

11,061 records were generated from the data received. Data were analysed to produce a classification of arable field assemblages.

The survey report noted limitations of the survey, especially lack of associated information on habitat management, heterogeneity of habitat within the sampled fields, and differences in evenness of recording.

Distribution data were amalgamated with other BBS data and disseminated through the NBN Gateway, although the dataset metadata do not highlight the SBAL data.

Case Studies 2

(An example of a data flow system and data verification in a smaller scheme)

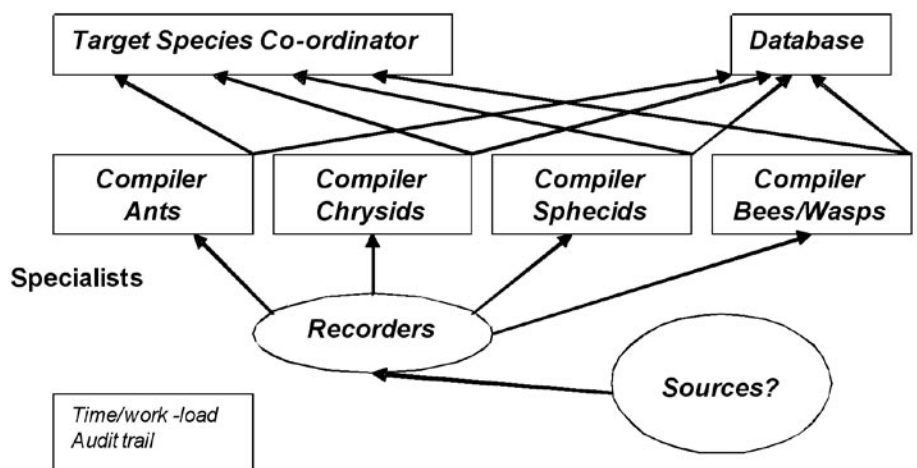
The Bees Wasps & Ants Recording Society (BWARS) and their data management and verification system

BWARS concentrates its recording on producing national distribution data for atlases of species. Recording is focused through short to medium term "projects", focusing on groups of species, which are then used to produce atlases. The production of an atlas is seen as a primary spur to encouraging recording.

The Society has an agreed, integrated process of managing data, including processes for data verification and validation:

Data are mainly received electronically, in various formats, and are integrated into a standard database.

All records are checked by recorders, and by the species group compilers. Doubtful records may be followed up by visits to the site from more experienced field workers.



Species identification is a particular concern, as some groups of species lack accessible identification literature, although this is improving. Recorders' competence is largely measured by a "peer review" process.

Requirements for the submission of voucher specimens for "critical" species are defined, although the species concerned depend on the

level of experience of the recorder.

Training in identification is carried out, and new recorders are encouraged to focus on small groups first.

Data from outside sources, e.g. local record centres, may not be acceptable, unless they have in place a process of collecting vouchers.

Case Studies 3

(Data verification and validation in a larger local record centre)

Cofnod uses various mechanisms to ensure that data it uses are of the highest possible quality, and that the quality of each record is clearly defined.

Use of metadata

Metadata are stored for each dataset it receives; and each record supplied to users is tagged with the ID of its source dataset, to help users assess its usefulness (Metadata can be viewed online).

Data validation

All electronic data received undergo validation checks before being added to the Cofnod database: each record must have a valid date, grid reference, and species name matching the NBN Species Dictionary. Other checks are being planned for geographic area and time periods.

Data from online recording

Using online recording minimises errors through removing third party data management. Online data are subject to similar validation checks to other data received, but at the point of data capture. Accuracy of grid references is aided by online mapping. Customised data entry lists can be set up for projects, and data may be viewed online by original recorders to help identify problems.

When the online system is used by Cofnod staff or volunteers, random checks of data input are made against original (paper) sources. Similar checks are carried out by recording groups using the system.

Data verification

Datasets are categorised according to presumed data quality based on the type of data supplier, and this information is added to the Metadata. Data from national recording schemes, county recorders, and other trusted sources are largely exempt from the verification which is required for data from any other sources (including any data captured from paper sources). Verification checks are carried out by external experts

(county recorders etc.) through the Online Recording System. Each record is automatically assigned for verification 3 days after entry, or after preliminary checks have been completed, depending on geographical location and taxonomic group. Availability of records for verification is notified to experts by email.

Records are flagged with an appropriate verification level:

Known incorrect; Probably incorrect; Unconfirmed; Probably correct; Known correct.

Notes can be added to explain decisions or highlight future action; and further details can be requested from recorders by email. Photographs can also be submitted in support. Verifiers can view records using an integrated online mapping facility.

If online records are not verified within 30 days, they are marked 'Unassessed'. Only data marked 'Known correct', 'Probably correct', 'Unconfirmed' or 'Unassessed' are supplied to data users.

Cofnod plans to extend its system by integrating rules used within the NBN Record Cleaner.

Case Studies 4

(Data validation and verification in the UK Biological Records Centre)

Processing datasets submitted to the UK Biological Records Centre

The following automated validation routines are applied during incorporation of data:

Species identifications

- Valid BRC species code used.
- BRC species code is for the appropriate taxonomic group.
- Any code used to flag species identification issues is valid.
- Any code used to explain record status is valid (e.g. native or introduced).

Location information

- Grid reference is in a valid format (e.g. TL22; 52/22).
- Any assigned 10km square value matches the grid reference provided.
- Any tetrad value provided is a valid 'DINTY' letter.
- Any 'DINTY' tetrad value given is correct for the grid reference given.

- Any code used to denote the quadrant of a 10km square is valid.
- Any quadrant value of a 10km square corresponds with the grid reference provided.
- Any code used to flag particular spatial data issues is valid.
- 10km square is on land (applicable to squares in Britain as well as Channel Islands and Ireland), and for 2km or 1km square grid reference (in Britain only).
- Valid Vice-county code.
- 10km square is in its corresponding Vice-county (applicable to squares in Britain as well as Channel Islands and Ireland), and for 2km or 1km square grid reference (in Britain only).
- Trim any extra spaces from locality name.

Date information

- Year is in a valid, four-digit format.
- Valid day and month used.
- Where values for day are provided, values for month are also provided.
- Where a year range is given the second year is after the first; all data in form 'before NNNN' (including publication dates); 'after NNNN' to be converted to ranges.
- A code used to explain dates given is valid.

Other information

- Name for recorders, determiners and compilers are in standard canonical form (e.g. Hill, M.O.); conversion to this form may be done at least partly algorithmically.
- Source of the record is validly coded (for field, museum etc).
- Where the record is from literature, the literature reference is stored.
- Altitude is within a valid range for measurements in metres.
- Any code denoting the type of recording card is valid.
- Any code denoting a particular type of record (e.g. droppings, tooth marks) is valid.
- Where habitat coding systems are used, any code denoting a habitat is valid.

Metadata are generated for each dataset, including: a brief description; name of data supplier; why the data were collected and how; what geographical area the data cover; what time-period they cover; and notes on the quality of the data, how they have been checked etc.

Automated processes to assist in the data verification process are also carried out: new Vice-county records; new 10km square records.

Reports and formatted copies of the checked dataset may be sent to the data supplier, identifying any necessary corrections to be made, before incorporation in the BRC database.

Case Studies 5

(Compiling data using a MapMate data-hub, and peer review to validate data)

A hypothetical MapMate system – verification and validation

A National Recording Scheme wants to implement a recording project that requires a network of field workers to be co-ordinated through County Recorders to achieve its target.

The National Recording Scheme has defined the level and extent of recording effort required, the processes of data verification and validation that are necessary, and the level of detail needed for records. Guidance has been produced.

Data collected by field workers are to be compiled direct onto MapMate databases by the field workers themselves.

The County Recorder has compiled and circulated guidance on data verification procedures, in agreement with the National Recording Scheme, including the level of verification required for “critical species”, where and how to submit voucher specimens etc. These form the basis for a suite of MapMate internal verification checks sent out to field workers that alert them to the need for

supporting evidence at the point of data entry.

The field recorders forward their data to the County Recorder on a regular basis through the use of MapMate’s database “synchronisation” process. However, in order to keep control of data quality, the Recording Scheme needs to ensure that data from the field recorder network are not disseminated elsewhere before they are checked, in order to avoid erroneous data being propagated. So the Scheme has issued guidance to ensure that only data validated through the County Recorder are passed on. The data originators amend any faulty data at source, which are re-synchronised with the County Recorder.

Because of the mutual synchronisation of data between the County Recorder and the local field recorders, the County database benefits from the mutual checking of records.

The County Recorder also runs initial automated validation routines on incoming data: species in new places; re-finds of species not seen for long periods; erroneous grid references (using MapMate’s internal mapping to spot errors). Having validated the data and arranged for necessary corrections to be made with the local fieldworkers, the County Recorder then synchronises the locally

compiled dataset on an agreed basis with the National Recording Scheme’s central “hub” database.

The National Recording Scheme organiser carries out further routine data validation processes, and also allows UK-wide data validation by the County Recorders through the MapMate network, by synchronising with them the entire national dataset annually.

Particular issues that might need to be faced by the MapMate hub system:

- A problem over the potential build-up of multiple “sites” and variants on site names in the MapMate hub database. This can be minimised by the County Recorder setting up agreed sites, and by guidance on use of grid references.
- Problems with faulty data unable to be changed if an originator fails to change the source records, dies or fails to appoint an “agent” to change their data.
- Failure to adhere to the guidance on data dissemination by one or more field workers, with the result that erroneous data becomes disseminated beyond the Recording Scheme.

Case Studies 6

(Automated data validation)

NBN Record Cleaner

The NBN Trust has developed a programme to validate datasets that providers send to the NBN Gateway in the NBN Exchange Format. It can also be used to check datasets in this format for other data exchange purposes. It does the following automated checks:

- Ensures that all mandatory columns are present (e.g.: date, species code etc.).
- The correct combinations of columns are present. (e.g.: for grid reference: either ‘gridreference’ or within a single record ‘Easting’ and ‘Northing’ are present but not both within a single record.).
- Each row of data has the correct number of fields.
- Dates are supplied in a standard format (dd/mm/yyyy).
- The end date is after the start date.
- Dates are valid in the calendar sense (e.g. 31st June).
- Grid references are in the correct format (either standard Ordnance Survey for Great Britain: TL207795; or Ordnance Survey Ireland: T213392).
- Values in the ‘Projection’ field are correct (e.g. OSGB, OSNI, WGS84 etc.).
- Values for ‘sensitive’ records and ‘zero abundance’ are either ‘True’ or ‘False’.
- Values in the ‘Precision’ field are correct for the grid reference precision given (in a 1-10000m resolution range).
- Each row has a unique ‘RecordKey’.
- Values in a field are no longer than the maximum length allowed (e.g. Site Names up to 100 characters).
- Taxon version keys are present in the NBN Species Dictionary.

NBN Record Cleaner checks each row in turn and reports which rows in the dataset have errors. These can be exported for later attention.

The records can also be mapped as a final check to ensure the distribution of points is what the data provider expected (so there are no nasty surprises when they see it for the first time on the NBN Gateway). Suspicious points on the map can be selected and the record details viewed.

9. Glossary of Terms

BRC

UK Biological Records Centre, CEH Wallingford (formerly Monks Wood) which oversees most of the voluntary terrestrial and freshwater recording schemes in the UK.

Indicia

The online recording toolkit developed by NBN Trust with funding through the OPAL Project, from the Big Lottery Fund

JNCC

Joint Nature Conservation Committee, Peterborough.

LRC

Local record centre(s) as a generic term.

NBN

National Biodiversity Network: the partnership of all organisations participating in the NBN project.

NBN Gateway

The Internet portal to data being shared by NBN partners.

NBN Record Cleaner

Automated data validation tool developed for the NBN Trust by JNCC.

NBN Species Dictionary

The electronic taxonomic dictionary and automated name-server run by the Natural History Museum to provide standard taxon names for the NBN Gateway and other data management software.

NBN Trust

The National Biodiversity Network Trust: the independent charity set up to oversee the development of the NBN.



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